

Application No.: 10/593,624
Art Unit: 1794

Amendment under 37 CFR §1.116
Attorney Docket No.: 062926

AMENDMENTS TO THE DRAWINGS

Applicants herein submit replacement sheet of drawing for Fig. 3.

Fig. 3 is amended to correct “Comparative Example Sample (4)” to --Comparative Example Sample (5)--.

REMARKS

Claims 1-2 and 4 are pending in the present application. Claim 4 is withdrawn from consideration. The specification, Fig. 3 and Claims 1 and 4 are herein amended. Claim 3 is herein cancelled. No new matter has been entered.

Applicants direct the Examiner's attention to the procedural error in the claim amendment. When the present application was filed on September 21, 2006, Applicants submitted a Preliminary Amendment incorporating the claim amendments by an Article 34 Amendment. However, Amendment under 37 CFR 1.111 filed on November 7, 2008 was erroneously made by amending the original claims.

Because the claims amended by the Amendment filed on November 7, 2008 was examined by the Examiner in the Office Action mailed on January 29, 2009, Applicants respectfully request that the Examiner to examine the claims currently amended from the claims amended by Amendment filed November 7, 2008.

Amendment to Specification

“Comparative example sample (4)” in Fig. 3 is a typographical error of --Comparative example sample (5)--. The error is obvious from the description in the specification as follows:

As representative examples, Present invention sample (2) and **Comparative example sample (4), which had the same Nd content** and exhibited highest (BH)_{max} values, were subjected to the crystal texture observation by using a scanning electron microscope (SEM) provided with an energy dispersive mass spectrograph (EDX).

(Specification, page 18, lines 18-23). In Table 1, it is Comparative example sample (5) not Comparative example sample (4) that corresponds to the description.

“Comparative example sample (5)” in Table 2 has been amended to –Reference example–. The related description also has been amended.

Restriction

The Examiner indicates that in the event that claims directed to the product are found allowable, withdrawn process claims that depend from or otherwise include all the limitations of the allowable product claim will be rejoined.

Because the process claim 4 is written to depend from the product claim, Applicants request that claim 4 be rejoined when the product claims are allowed.

Rejections under 35 USC §102(b)

Claims 1-3 were rejected under 35 USC §102(b) as being anticipated by Yamashita et al. (U.S. Patent No. 7, 285, 338)(WO 02/15206).

Responding to Applicants’ previous response, the Examiner alleged as follows:

Applicant argues that the heat treatment is inseparably connected to the atomic layered unit structure. Examiner agrees with this analysis. However, Yamashita et al. clearly understands that heat treatment will change the magnetization as admitted by applicant (Page 7 in Remarks date 11/7/08). Yamashita clearly understands that interdiffusion occurs in the atomic structure through heat treatment. Examiner interprets a heat treatment to be related to time, temperature and atmospheric conditions. **Yamashita clearly understands that the temperatures must be greater than 600 K (327C) and optimally less than 900 K (627) which would overlap applicant's ranges.** Yamashita utilizes significantly different

atmospheric conditions than applicant and given these differences the product would necessarily be the same as applicants. Unless applicant is willing to supply substantial proof, examiner has no way to distinguish the Yamashita invention would differ from applicants. However, considering that the differences appear to be process related and heat treatment is well known in the art, the Supreme Court explained in KSR, "If a technique has been used to improve one device and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." 127 S. Ct. at 1740. Applicant has not clearly distinguished his claims such that they would necessarily/ obviously different than Yamashita.

(Office Action, page 2). However, the Examiner's allegation ignores clear difference between the present invention and Yamashita et al.

Although the Examiner says that he has no way to distinguish the Yamashita invention would differ from the present invention, there *are* clearly recognizable differences between the present invention and Yamashita et al. Also, these differences are not obvious for a person having ordinary skill in the art. The differences are as follows:

Regarding Claims 1-3:

(1) Difference in Metallic Structure:

The present claim 1 recites R-Fe-B alloy based thin film which has a composite texture comprising **R₂Fe₁₄B crystals** grown by heat treatment of said alloy film and having a crystal grain diameter of 0.5 to 30 μm and **R-element-rich grain boundary phases formed by the heat treatment** present at boundaries between the crystals.

On the other hand, Yamashita et al. discloses layering one or a plurality of atomic layered units in which a monoatomic layer based on a rare-earth element is layered on a substrate of a

nonmagnetic material, and a plurality of monoatomic layers of a transition metal element are then layered (see Yamashita et al., column 2, lines 8-32).

(2) Difference in Alloy Composition:

The present claim 1 recites R-Fe-B alloy based thin film. On the other hand, Yamashita et al. discloses layered structure of monoatomic Nd layers and Fe layers, which does not contain B (Yamashita et al., column 6-7, Example 1).

Although Yamashita et al. also discloses as a **comparative example**, Nd Fe B ingot in TABLE 3, the alloy is used as a target to obtain thin Nb Fe B film by sputtering. Yamashita et al. does not discuss heat treatment of the film of the comparative example. (See Yamashita et al., column 7, Comparison 1).

The Examiner alleged as follows:

As to claim 1, Yamashita et al. '338 discloses that the magnetic flux density is determined by the percentage of rare earth material in the film such as R2Fe14B and further discloses the density can be impacted by manipulating percentages (Col. 5, 6, line 59-87, 1-4). The Examiner interprets the grain diameters, and nucleation type coercive force to be an inherent feature as both applicants and '338 as both look to utilize a heat treated R-T-B magnetic thin film, and both use R2Fe14B.

However, it is not true that Applicants and Yamashita et al. both "look to utilize a heat treated R-T-B magnetic thin film, and both use R2Fe14B." Yamashita et al. describes as follows:

In the present invention, the residual magnetic flux density of the atomic layered unit is primarily determined by the percentage content (Nd:Fe=1:X) of the transition metal element (for example, Fe) in relation to the rare-earth element (for example, Nd). For example, the density becomes greater than that of R2Fe14B, which is the primary phase of a sintered magnet based on R Fe B, if the ratio X exceeds 7.

(Yamashita et al., column 5, lines 59-66). Thus, the thin film disclosed in Yamashita et al. does not contain R2Fe14B.

(3) Difference in a single layer:

Claim 1 recites “the alloy film has a thickness is 0.2 to 400 μ m.” Thus, according to the present invention, a single alloy film magnet of the present invention has the film thickness of 0.2 to 400 μ m.

In contrast, Yamashita et al. does not disclose an **alloy film** having a thickness is 0.2 to 400 μ m. Although Yamashita et al. makes a thin film magnet with a thickness of 100 Å to several μ m, the atomic layered formation 13 of the film comprises the monoatomic layer 10 of a rare-earth element and the layered formation 12 of monoatomic layers 11 of the transition metal element in a single thin film, and the operations involved in layering a plurality of such units are repeated. TABLE 2 in Yamashita et al. shows an atomic layered formation 13 including monoatomic layers of Nd of 3-6 Å thickness and monoatomic layers of Fe of 10-15 Å thickness.

Thus, the Examiner has not shown that the differences shown above are disclosed in the prior art. The Examiner also has not shown that how a person having ordinary skill in the art can modify the teaching of Yamashita et al. and arrive at the present invention as recited in claim 1.

Regarding Claims 4:

(1) Difference in Heat Treatment:

The present claim 4 recites “heating the R-Fe-B based alloy to 700°C to 1,200°C . . . so as to grow crystal grains and form R-element-rich grain boundary phases.” On the other hand,

the temperature of the treatment according to Yamashita et al. is 600 K to 900 K, which is 327 °C to 627 °C, which is significantly lower than the temperature of the present invention of 700 °C to 1200 °C.

Yamashita et al. describes as follows:

The temperature of the heat treatment varies with the composition or film thickness and should preferably be 600 K to 900 K. Successfully performing the heat treatment for a long time at a low temperature can control the interdiffusion between the rare-earth element and transition metal element, and ultimately tends to produce a material with high magnetic characteristics. Interdiffusion is apt to occur between the rare-earth element and transition metal element if the heat treatment temperature exceeds 900 K, and the strain or defects are inadequately corrected, and improved magnetic characteristics are impossible to obtain, if the heat treatment temperature is less than 600 K.

(Yamashita et al., column 6, lines 14-26). Thus, according to Yamashita et al., it is necessary that the heat treatment temperature does not exceed 900 K, to prevent inter-diffusion between the rare-earth element and transition metal element.

Yamashita et al. also describes as follows:

In conventional practice, thin-film rare-earth permanent magnets are primarily obtained by the layering of materials based on Nd Fe B by vacuum vapor deposition or sputtering. The crystal structures of the layered formations obtained by these methods are disadvantageous in that the axis of easy magnetization is random, isotropic permanent magnet characteristics alone can be obtained in terms of magnetic characteristics, and only magnetic characteristics that are vastly inferior to those of anisotropic sintered permanent magnets can be obtained.

(Yamashita et al., column 1, lines 28-37). Thus, to solve the problem, Yamashita et al. invented a thin-film rare-earth permanent magnet without using Nd-Fe-B alloy. In contrast, although

knowing the same problem, the present inventors made the thin film magnet using an R-Fe-B alloy.

Thus, there *are* clear differences between the present invention and Yamashita et al., which are not obvious for a person having ordinary skill in the art. Although the Examiner cited the Supreme Court decision in *KSR*, the Examiner has not shown that the same technique has been used to improve one device and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

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If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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